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1. A method of conformally coating a microtextured surface, comprising:
  - (a) making an evaporate by receiving a polymer precursor into a flash evaporation housing, evaporating the polymer precursor on an evaporation surface, and discharging the evaporate through an evaporate outlet;
  - 5 (b) making a polymer precursor plasma from the evaporate by passing the evaporate proximate a glow discharge electrode; and
  - (c) cryocondensing the polymer precursor plasma as a condensate onto the microtextured surface and polymerizing the condensate before the condensate flows thereby conformally coating the microtextured surface.
2. The method as recited in claim 1, wherein the microtextured surface is proximate the glow discharge electrode, and is electrically biased with an impressed voltage.
3. The method as recited in claim 1, wherein the glow discharge electrode is positioned within a glow discharge housing having an evaporate inlet proximate the evaporate outlet, the glow discharge housing and the glow discharge electrode maintained at a temperature above a dew point of the evaporate, and the microtextured surface is downstream of the polymer precursor plasma, and is electrically floating.
- 5 4. The method as recited in claim 1, wherein the microtextured surface is proximate the glow discharge electrode, and is electrically grounded.
5. The method as recited in claim 1, wherein the polymer precursor is selected from the group of phenylacetylene, (meth)acrylates, alkenes, and alkynes, and combinations thereof.
6. The method as recited in claim 1, wherein the microtextured surface is cooled.



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7. The method as recited in claim 1, further comprising adding an additional gas to the evaporate.
8. The method as recited in claim 7, wherein the additional gas is a ballast gas.
9. The method as recited in claim 7, wherein the additional gas is a reaction gas.
10. A method for conformally coating a microtextured surface in a vacuum chamber, comprising:
  - (a) flash evaporating a polymer precursor forming an evaporate;
  - (b) passing the evaporate to a glow discharge electrode creating a glow discharge polymer precursor plasma from the evaporate; and
  - (c) cryocondensing the glow discharge polymer precursor plasma as a condensate on the microtextured surface and crosslinking the condensate thereon, the crosslinking resulting from radicals created in the glow discharge polymer precursor plasma for self curing, the crosslinking occurring before the condensate flows, thereby conformally coating the microtextured surface.
11. The method as recited in claim 10, wherein the microtextured surface is proximate the glow discharge electrode, and is electrically biased with an impressed voltage.
12. The method as recited in claim 10, wherein the glow discharge electrode is positioned within a glow discharge housing having an evaporate inlet proximate the evaporate outlet, the glow discharge housing and the glow discharge electrode maintained at a temperature above a dew point of the evaporate, the microtextured surface is downstream of the glow discharge polymer precursor plasma, and is electrically floating.
13. The method as recited in claim 10, wherein the microtextured surface is proximate the glow discharge electrode, and is electrically grounded.



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14. The method as recited in claim 10, wherein the polymer precursor is selected from the group of phenylacetylene, (meth)acrylates, alkenes, and alkynes, and combinations thereof.
15. The method as recited in claim 10, wherein the microtextured surface is cooled.
16. The method as recited in claim 10, further comprising adding an additional gas to the evaporate.
17. The method as recited in claim 16, wherein the additional gas is a ballast gas.
18. The method as recited in claim 16, wherein the additional gas is a reaction gas.
19. The method as recited in claim 10, wherein flash evaporating comprises:
  - (a) supplying a continuous liquid flow of the polymer precursor into a vacuum environment at a temperature below both the decomposition temperature and the polymerization temperature of the polymer precursor;
  - (b) continuously atomizing the polymer precursor into a continuous flow of droplets; and
  - (c) continuously vaporizing the droplets by continuously contacting the droplets on a heated surface having a temperature at or above a boiling point of the polymer precursor, but below a pyrolysis temperature, forming the evaporate.
20. The method as recited in claim 19 wherein the droplets range in size from about 1 micrometer to about 50 micrometers.



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21. The method as recited in claim 10 wherein flash evaporating comprises:

(a) supplying a continuous liquid flow of the polymer precursor into a vacuum environment at a temperature below both the decomposition temperature and the polymerization temperature of the polymer precursor; and

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(b) continuously directly vaporizing the liquid flow of the polymer precursor by continuously contacting the polymer precursor on a heated surface having a temperature at or above a boiling point of the polymer precursor, but below a pyrolysis temperature, forming the evaporate.

TO BE SET FOR